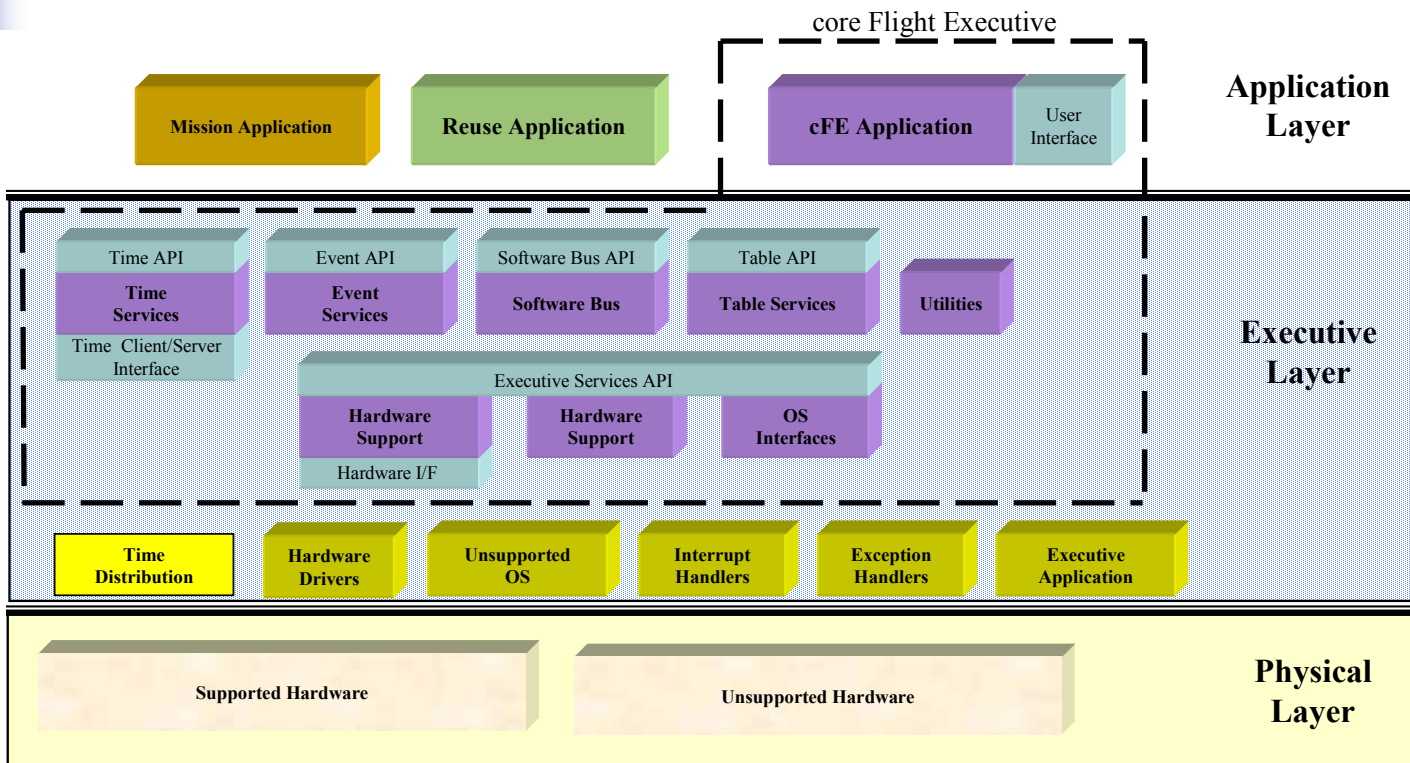# Core Flight Executive
Code 582 / Jonathan Wilmot

Goals, Objectives, Benefits

- A set of **mission independent, re-usable, core** flight software services and operating environment including:
  - Executive Services   - Software Bus
  - Time Services   - Event Message Services
  - Table Services   - File Service

- Easy-to-use, well-defined APIs
  - Eliminates need to know internal flight software
  - Users develop applications that conform to API and Go!

- Hardware and OS independent
  - Can be run on variety of platforms
  - Uses OS Abstraction
  - Hardware dependencies are isolated

Approach

core Flight Executive

Application Layer

Mission Application

Reuse Application

cFE Application | User Interface

Executive Layer

Time API
Time Services
Time Client/Server Interface

Event API
Event Services

Software Bus API
Software Bus

Table API
Table Services

Utilities

Executive Services API
Hardware Support
Hardware Support
OS Interfaces
Hardware I/F

Time Distribution

Hardware Drivers

Unsupported OS

Interrupt Handlers

Exception Handlers

Executive Application

Physical Layer

Supported Hardware

Unsupported Hardware

Software Interface

Mission Specific Software

Hardware

582 FSW Library

Approach (continued)

- **Unified software bus**
  - One message bus for the entire system: spacecraft, constellation, or GSE
  - Subscription-based: In line with popular COTS middleware (Connexis, ORB, NDDS)
  - Allows for dynamic routing of packets

- **Eases flight software development and on-orbit maintenance**
  - Allows for adding and removing tasks
  - New applications can be written, compiled and loaded without rebuilding the entire system
  - Easily tailored to missions via configuration parameters

- **Supports a variety of development environments**
  - cFE can run on flight processors, desktops, in simulators, and even on PDAs!

Results

- Re-use
  - Engineer can download cFE & artifacts from Branch reuse library
  - Tailor configuration parameters to mission
  - Add mission applications
  - Build & test system with re-usable test procedures

- Subset being used on SDO
- Targeted for HRV, LRO, GMSEC lab
- Prototype used for technology development efforts: MR2, Ethernet, SpaceWire